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## EXPERIENCE WITH LEADITE IN JOINTING CEMENT-LINED WATER PIPE

By W. H. BUCK

The subject of using leadite for making joints in cast iron bell and spigot water mains has been discussed at different conventions and several papers have been written about leadite in this connection. It may interest some of the water works fraternity to hear something about leadite for making joints in cement lined water mains.

For several years prior to 1910 leadite as a pipe jointing material had been considered by the writer, and finally, some time in July, 1910, it was given a tryout on a short spur of a little over 1000 feet of 4-inch water main laid on the outskirts of Palmyra. This seemed to be a good place to try it, because, in case it did not come up to the standard, the remaking of the joints would not inconvenience anyone much. If the leadite proved satisfactory on this line, it was the intention to use it on quite a number of extensions which the company contemplated laying later in the season, including a 16-inch cement pumping main, and various spurs and feeders ranging in size from 4 inch to 16 inch, making a total of several miles of new mains.

Well, after pouring the last joint on the experimental line of over 1000 feet, the water was turned on, and every joint after careful examination was found to be bottle tight. The gratifying result of this experiment gave confidence to tackle the larger operation with leadite, which was done with the most satisfying result. A few slight leaks occurred, or sweats rather than leaks, which took up, and were absolutely tight within forty-eight hours. The writer has never had to make over a leadite joint, or found a joint made with leadite on our whole system that showed the slightest sign of a leak after it had once closed up.

From this experience, it seems safe to believe that a leadite joint once tight is good for all time. Another thing, when occasion arises to cut out a joint for different reasons, such as cutting in specials, valves, etc., a man with the proper tools can cut out a 6-inch leadite joint in about twelve minutes, where it would take the same

man much longer to cut out a lead joint of the same size. Then, too, a wet joint can be poured successfully with leadite without the slightest danger to the workmen, this having been done a number of times in the last six years and always with success. It is often very difficult and dangerous to pour wet joints with lead. Of course it is always better to have the joint dry for either leadite or lead, but at times there are circumstances which make it necessary to pour a wet joint.

Some people think it is difficult to handle leadite, but it is not necessarily so. If you have your joints thoroughly clean from all dirt, and yarned up tightly with a good dry yarn, and the leadite properly melted, success should crown your efforts.

One ton of leadite will do as much work as 5 tons of lead. The manufacturers claim that 1 ton of leadite is equal to 4 tons of lead, but leadite goes further with us because we make our joints 2 inches instead of  $2\frac{1}{2}$  inches deep as specified by the leadite makers. Also much less labor is required for putting leadite in, and probably every one will agree that labor, at the present time especially, is an item worth considering. In the first place there is no caulking necessary; this brings the cost of digging bell holes down to rock bottom, as they need only be large enough so that a man can drive the yarn in. The cost for freight, carting, and handling, etc., is about one-fourth of that for lead. Leadite in the writer's opinion, if handled right, is the best and most economical jointing material on the market today.

### DISCUSSION

MR. D. W. FRENCH: In the event of a leadite joint being improperly poured, or possibly leaking, is it not a fact that it must necessarily be cut out and rerun; that it cannot be caulked?

MR. W. H. BUCK: If a leadite joint does not run perfectly, or if for some reason you have a leak, or the joint is not perfect from any cause, you can cut the imperfect part out, and bank it up with clay, and after that part of the joint is again fused it will be just as good as though it were all poured at one time. A joint can be partly made, or it can be poured with one or more pours and it will be perfectly tight.

MR. D. W. FRENCH: If it is made and it is a failure, it is probably due to improper temperature, is it not?

MR. W. H. BUCK: Very largely so. If the leadite is too hot it becomes thick and gummy; if too cold, it will not fill out as it should. The proper temperature for leadite is about 400°. It does not take an expert to get the correct idea of when the leadite has arrived at the proper temperature, for when it does that it is just like the surface of a mirror, there is no froth, no bubbles or anything like that on the surface; you can see your reflection in it as you could in a mirror; then is the proper time to pour. The speaker has gotten up tools of his own for handling leadite. One tool, like a ripper, such as is used on a boiler tube, or virtually a cape chisel, is made on a bevel so that it will go between the spigot end and inside of bell, and a joint can be cut out with it. It cuts very rapidly. The speaker has cut out a 6-inch joint in nine minutes. Some of his men have cut out a joint in less than twelve minutes.

MR. D. A. REED: Has the gentleman ever used leadite for joints in pipe laid under a railroad track, where it is subject to excessive vibration; and if so, has it been successful?

MR. W. H. BUCK: No. That condition has not been encountered.

MR. D. A. REED: Does leadite shrink, or expand in joints?

MR. W. H. BUCK: It expands. It must be poured hot, and as it gets colder it gets tighter.

MR. J. M. DIVEN: There is no subject that has been brought up before this convention on which we have had more conflicting testimony than with reference to leadite. One member praises leadite to the skies; another utterly condemns it; many of them men of large experience and very careful in research work. This leads one to believe that there is something peculiar about the handling of it; there must be some knack. It must be that the temperature is not always exactly right. If it is going to be a success we ought to have some absolute knowledge as to what the temperature should be in pouring, or some means of controlling the temperature when melting in the pot.

MR. W. H. BUCK: The temperature is very essential. Another important matter is the cleanliness of the joints. The speaker never employs an old time lead caulker on a leadite job, but takes men out of a gang and makes yarners and joint makers of them; because the old time lead caulker seems to have a certain amount of prejudice against leadite, and there is where the trouble arises to a very large extent when people make a failure of leadite.

MR. J. M. DIVEN: If it is over heated in melting is it spoiled?

MR. W. H. BUCK: No, after a little experience one becomes accustomed to the proper way of melting so that he can do it to a nicety. The speaker has a four burner gasoline furnace; to start, the pot is filled half full of the powder, the four burners are allowed to burn until the powder is partly melted, then one burner is turned off, and more of the raw material is put in; at intervals another burner is turned off, until only one remains. The leadite should be stirred constantly with a ladle until it is practically all dissolved. If you keep the ladle hot you can get right down to the bottom. Always stir from the bottom thoroughly, and then if the joints are not ready to be poured turn the flame of the burner down to just a flicker, and before you take out a ladleful give it a stir two or three times, then take out your ladleful and pour. Cement pipes can be poured practically ten joints at a time, that is for every 100 feet, the pipe being in lengths of 9 feet 5 inches. The furnace is moved ahead 100 feet at a time. Just as soon as the joints are poured another batch is gradually melted, so that there is not an excessive amount on the fire at any one time, thus preventing thickening of the leadite.

MR. J. M. DIVEN: There is considerable sulphur in this composition, and sulphur is not healthy for cast iron, and less so for wrought iron. From the investigations that you have made can you say whether there is any danger from the action of the sulphur on the iron?

MR. W. H. BUCK: There is nothing more susceptible to corrosion than steel. On the spigot and bell ends of cement pipe there is headed on by an acetylene process a reinforcing jacket of steel. On taking out fire hydrants, joints that were made six years ago, have not shown the slightest bit of corrosion of these jackets.

MR. D. R. GWINN: We have had some experience with leadite at Terre Haute. About seven years ago we put in a couple of blocks of 6-inch pipe using leadite for joints, and we let them stand for a year or two to see how it would work, then dug up the joints and found them in good condition; so then we laid about five miles of pipe from 6-inch to 12-inch, with leadite joints. It recalls the famous little girl who "when she was good she was very, very good, but when she was bad, she was horrid!" Leadite when good is very fine, indeed, but when it does not work out all right, then it is like that little girl. A great deal depends upon the man who is running the kettle; if he gets too much fire and lets the leadite apparently boil he will not get very good results. One job that was put in in a hurry gave a great deal of trouble. The street was paved shortly afterward, and has been dug up presumably fifteen times in about a half mile of pipe. Then in other cases we have never had a particle of trouble.

Again, a great deal depends upon the end of the spigot being thoroughly clean. You must have, also, hemp which is not oily. These are the main points; that you have a good man to attend to the kettle; that the substance is not allowed to boil off too fast; and that some one watch the pipe to see that there is no foreign substance on the spigot and in the bell, but that both are thoroughly clean, and that the hemp is all right. If these conditions are observed you will get very good results. One great advantage is that you do not have to dig deep bell holes, and you can make pretty rapid time laying pipe.

MR. W. E. MILLER: Would an ordinary gasoline blow-torch answer for melting out leadite joints?

MR. W. H. BUCK: Yes, but you will find that it will be slower work than with an oxygen blow-pipe. The quickest way is to cut it out, unless you have an oxygen blow-pipe.

MR. J. M. DIVEN: Do you refer to the oxy-acetylene outfit?

MR. W. H. BUCK: Yes.

MR. J. M. DIVEN: It melts at a lower temperature than lead, does it not?

MR. W. H. BUCK: Yes.

MR. J. M. DIVEN: For that reason it should be much easier to melt out than lead.

MR. W. H. BUCK: It is.

MR. D. W. FRENCH: From what Mr. Buck said he has had occasion to cut out a great many joints for one reason, or another; and the speaker has been wondering what the reason was for his having had to cut them out.

MR. W. H. BUCK: In making inspections or putting in special valves.

MR. D. W. FRENCH: Not because of trouble in pouring the joints?

MR. W. H. BUCK: No, indeed.